

BT-3 / D-13

ANALOG COMMUNICATION

Paper-ECE-203(E)

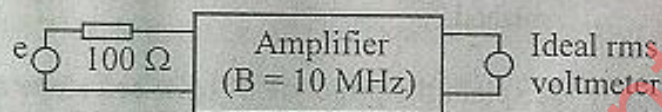
Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt any five questions.

1. (a) Derive an expression for the equivalent noise temperature of a cascade of networks in terms of their individual equivalent noise temperatures. 5

- (b) The following system is maintained at $T = 290^\circ \text{K}$. When $e = 0 \text{ v}$, the voltmeter reads 3 volts. When $e = 10 \mu \text{ v rms}$, the voltmeter reads 5 volts. Find the noise figure. 5



2. (a) Explain the following terms : (i) Signal to noise ratio (ii) Noise Figure (iii) Noise bandwidth (iv) Noise temperature. 6

- (b) Show that when Gaussian noise is applied to a filter the output is also Gaussian. 4

3. (a) Draw the circuit diagram of a balance modulator and explain its working. Derive the relation for the output produced by the modulator circuit. Why the circuit is known as balance modulator? 6

- (b) Explain the vestigial side band modulation. What are the advantages and disadvantages of VSB modulation over amplitude modulation? 4

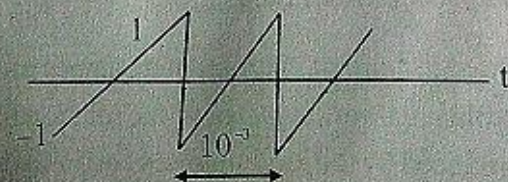
4. (a) With the help of a diagram explain the principle of envelope detection used for the demodulation of AM signals. Also derive the expression for the time constant of envelope detector. 5

- (b) Explain amplitude modulation. Derive expression for AM waveform. Plot frequency spectrum of an AM waveform. Draw the AM signal when modulation index is greater than 2. 5

5. (a) Describe the reactance modulation method of FM generation. How is frequency stability obtained in this method? 5

- (b) Explain the principle of balanced slope detector for demodulation of FM signal. 5

6. (a) Draw the waveforms of frequency and phase-modulated signals for the given modulating signal. Why should K_p be less than π for phase modulation? 5



- (b) Discuss the effect of noise on FM signals. Explain what do you mean by noise triangle. 5
7. (a) Draw the block diagram of volume compressor circuit and explain the function of volume compressor in a radiotelephone transmitter. 6
- (b) Enumerate the precautions necessary in the design and operation of an L-C oscillator as a Master oscillator in a radio transmitter. 4
8. (a) Draw the block diagram and explain the working of a TRF receiver. List out its advantages and disadvantages? 5
- (b) When a super heterodyne receiver is tuned to 555 KHz, its local oscillator provides the mixer with an input at 1010 KHz. What is the image frequency? The antenna at receiver is connected to mixer via a tuned circuit whose loaded Q is 40. What will be rejection for the calculated image frequency? 2
- (c) Define the following terms:
- (i) Frequency scintillation
- (ii) Image frequency. 3